Docket No.: 8540G-000210/US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: **Ralph Hobmeyr**

Application No.: **10/717,356** Confirmation No.: 7713

Filed: **November 19, 2003** Art Unit: 1795

For: **Vehicle plumbing to release hydrogen from fluid** Examiner: Wills, Monique M.

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal, filed on November 18, 2009, and is in furtherance of the Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.02:

I. Real Party In Interest
II Related Appeals and Interferences
III. Status of Claims
IV. Status of Amendments
V. Summary of Claimed Subject Matter
VI. Grounds of Rejection to be Reviewed on Appeal
VII. Argument
VIII. Claims
Claims Appendix
Evidence Appendix
Releated Proceedings Appendix

RWM/TJM/ss

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is: GM Global Technology Operations, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 8 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 9-32
2. Claims withdrawn from consideration but not canceled: 0
3. Claims pending: 1-8
4. Claims allowed: 0
5. Claims rejected: 1-8

C. Claims On Appeal

The claims on appeal are claims 1-8.

IV. STATUS OF AMENDMENTS

Applicant filed an Amendment on April 28, 2008 in response to the Non-Final Rejection of January 29, 2008. The Examiner indicated that Applicant's proposed amendments to claims 1-8 would be entered.

Accordingly, the claims enclosed herein as Appendix A incorporate the amendments to claims 1-8, as indicated in the paper filed April 28, 2008. There are no un-entered amendments.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 recites a fuel cell system (e.g., fuel cell system 10, FIG. 1; see p. 4, lns. 14-15) having a cooling fluid (e.g., coolant, FIG. 1; see p. 5, lns. 4-7) flowing therethrough, comprising: a fuel cell stack (e.g., fuel cell stack 12, FIG. 1; see p. 4, lns. 14-15) including a plurality of proton exchange membranes (membranes included in the fuel cells within the fuel cell stack 12; see p. 4, lns. 15-17) each having an anode side (e.g., anode side; see p. 4, lns. 17-21) and a cathode side (e.g., cathode side; see p. 4, lns. 17-21) and a plurality of coolant passages (e.g., coolant circulation path; see p. 5, lns. 10-13) extending between adjacent ones of said plurality of proton exchange membranes; and a conduit (e.g., hydrogen permeable conduit (HPC) 16, FIG. 1; see p. 5, lns. 4-7) in fluid communication with said coolant passages and through which said cooling fluid flows (e.g., coolant flow indicated by arrow, FIG. 2; see p. 6, ln. 14) and comprising a first layer of hydrogen-permeable material (e.g., tube 30, FIG. 2; see p. 6, lns. 15-16), wherein hydrogen within said cooling fluid permeates through said first layer of hydrogen-permeable material to reduce a hydrogen content of said cooling fluid (e.g., H, tube 30, FIG. 5; see p. 8, lns. 6-14).

Dependent claim 2 recites a fuel cell system further comprising a support layer (e.g., support layer 36, FIG. 3; see p. 7, lns. 10-11) disposed concentric to said first layer of hydrogen-permeable material.

Dependent claim 3 recites a fuel cell system wherein said support layer is breathable to enable passage of said hydrogen to atmosphere (see p. 7, lns. 11-13).

Dependent claim 4 recites a fuel cell system wherein said support layer includes a mesh through which said hydrogen permeates (see p. 7, lns. 10-13).

Dependent claim 5 recites a fuel cell system further comprising a second layer of hydrogen-permeable material (e.g., tube 34, FIG. 3; see p. 7, lns. 7-10) disposed about said first layer of hydrogen-permeable material.

Dependent claim 6 recites a fuel cell system further comprising a support layer (e.g., support layer 32, FIG. 3; see p. 6, lns. 14-17) disposed between said first and second layers of hydrogen permeable material.

Dependent claim 7 recites a fuel cell system further comprising a fluid-permeable protective layer (e.g., support layers 32, 36, FIG. 3; see p. 7, lns. 13-19) disposed about said conduit, protecting said conduit from impact with debris.

Dependent claim 8 recites a fuel cell system further comprising a hydrogen-permeable layer having a partial catalyst coating (e.g., catalyst coating; see p. 7, line 20 – p. 8, line 5) to induce a reaction between said hydrogen and oxygen to produce water.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether the combination of U.S. Pat. No. 6,919,062 ("Vasileiadis") in view of U.S. Pat. Pub. No. 2004/0157099 ("Kato") and further in view of U.S. Pat. Pub. No. 2003/0159354 ("Edlund") establishes a prima facie case of obviousness of claims 1-8.

VII. ARGUMENT

1. The combination of U.S. Pat. No. 6,919,062 ("Vasileiadis") in view of U.S. Pat. Pub. No. 2004/0157099 ("Kato") and further in view of U.S. Pat. Pub. No. 2003/0159354 ("Edlund") fails to establish a prima facie case of obviousness of claims 1-8.

CLAIM 1

Claim 1 includes the limitation of "fuel cell system . . . comprising: a fuel cell stack including a plurality of proton exchange membranes . . . and a plurality of coolant passages extending between adjacent ones of said plurality of proton exchange membranes; and a conduit in fluid communication with said coolant passages . . . and comprising a first layer of hydrogen-permeable material."

Vasileiadis discloses feed gases and steam flowing through a permreactor-separator, yielding a hydrogen-based gas that can be supplied to an anode side of a fuel cell stack (Abstract, FIG. 11). Vasileiadis further discloses the permreactor-separator comprising a hydrogen-permeable tube (col. 3, ln. 63 – col. 4, ln. 9). As the Examiner acknowledges, Vasileiadis does not disclose that the hydrogen-permeable tube is in fluid communication with coolant passages extending between proton exchange membranes of

a fuel cell. Thus, Vasileiadis does not teach or suggest a hydrogen-permeable conduit in fluid communication with coolant passages, as claimed.

Kato discloses coolant passages 32a, 32b between membrane electrode assemblies 22 in a fuel cell 12 (FIG. 2). The Examiner cites Kato for teaching that it is well known to employ coolant passages between membranes of fuel cells. The Examiner asserts that it would have been obvious to employ the cooling arrangement of Kato in the fuel cell of Vasileiadis in order to control stack temperature and reactivity between the fuel cells. However, Kato does not teach or suggest a hydrogen-permeable conduit in fluid communication with coolant passages, as claimed.

Edlund discloses a steam reformer 12 that separates a hydrogen stream from a vapor feedstock to provide hydrogen to a fuel cell 16 and that includes a membrane tube 54 (para. [0033], lns. 4-5; Para. [0034], lns. 1-11; para. [0040], lns. 1-7; FIGS. 1 and 2). Edlund further discloses that the membrane tube 54 may be composed of hydrogen-permeable materials (para. [0043], lns. 4-7). The Examiner cites Edlund for teaching that it is well known to employ hydrogen-permeable tubes in fuel cell stacks. The Examiner asserts that it would have been obvious to employ the tube of Edlund in the fuel cell of Vasileiadis in order to separate products in the vicinity of the membrane tube. However, Edlund does not teach or suggest a hydrogen-permeable conduit in fluid communication with coolant passages, as claimed.

Thus, none of the references teach or suggest a hydrogen-permeable conduit in fluid communication with coolant passages, as claimed. It is a longstanding rule that to establish a prima facie case of obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. In re Royka, 180 USPQ 143

(CCPA 1974). See MPEP § 2143.03. For at least the above reasons, Applicant respectfully asserts that claim 1 defines over the cited art.

Nonetheless, the Examiner asserts that Vasileiadis discloses a hydrogen-permeable tube in fluid communication with coolant passages extending between membranes of a fuel cell because fuel passages and coolant passages are both located between a proton exchange membrane and electrodes. The Examiner also asserts that the permreactor-separator of Vasileiadis satisfies the instant claims because the fuel from the permreactor will be charged to fuel passages located between the membrane and the electrodes in order for the fuel cell to function. The Examiner further asserts that the conduit is in fluid communication with the passages by providing fuel to the cell.

At the outset, Applicant notes that Vasileiadis does not explicitly disclose that the permreactor-separator is in fluid communication with fuel passages extending between proton exchange membranes. Rather, as discussed above, Vasileiadis discloses that the permreactor-separator is in fluid communication with the anode side of a fuel cell stack. However, even if Vasileiadis were to disclose that the permreactor-separator is in fluid communication with fuel passages extending between proton exchange membranes, Applicant maintains that Vasileiadis does not teach or suggest a hydrogen-permeable conduit in fluid communication with coolant passages extending between proton exchange membranes, as claimed.

Applicant submits that a hydrogen-permeable conduit in fluid communication with coolant passages to remove hydrogen from coolant, as recited in claim 1, is fundamentally different from a hydrogen-permeable conduit in fluid communication with fuel passages to supply hydrogen separated from feed gases, as allegedly disclosed in Vasileidis.

Applicant submits that coolant passages and fuel passages are different even if both are located between a proton exchange membrane and electrodes. The present specification indicates that coolant is circulated through the fuel cell stack to maintain the fuel cell stack at a desired operating temperature (para. [0003], lns. 1-11). Applicant submits that one skilled in the art would acknowledge that water (H_2O) or other coolant fluid is typically used as the coolant. In contrast, the present specification indicates that hydrogen (H_2) is supplied to the anode side of the fuel cell to produce electricity through an electrochemical reaction (para. [0018], lns. 4-8). Thus, coolant passages transport a coolant, such as water (H_2O), to maintain the fuel cell stack at a desired operating temperature, while fuel passages transport hydrogen (H_2) to produce electricity through an electrochemical reaction. There is no teaching in the prior art for separating hydrogen from the coolant used to cool a fuel cell stack, as claimed.

In addition, Applicant notes that Vasileiadis, as well as Edlund, must be considered in their entirety, i.e., as a whole, including portions that would lead away from the claimed fuel cell system. "A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). See MPEP 2141.03.

As discussed above, Vasileiadis and Edlund disclose passing steam and feed gases through a hydrogen-permeable tube to separate hydrogen for use in a fuel cell. Modifying the fuel cell systems of Vasileiadis and Edlund by placing the disclosed hydrogen-permeable tubes in fluid communication with coolant passages would ignore the portions of Vasileiadis and Edlund that lead away from the claimed fuel cell system. More

specifically, modifying the fuel cell systems of Vasileiadis and Edlund in this manner would ignore the portions of Vasileiadis and Edlund which teach that hydrogen-permeable tubes are for separating hydrogen from feed gases for use in a fuel cell.

Therefore, Applicant respectfully asserts that claim 1 is allowable. Claims 2-8 depend from claim 1 and therefore should be allowable for the reasons as stated above. Therefore, Applicants request that this board overturn the above rejection of claims 1-8.

CLAIM 3

Claim 3 recites a "support layer" that is "breathable to enable passage of said hydrogen to atmosphere." Vasileidis is silent as to a support layer that is breathable to enable passage of hydrogen to the atmosphere.

Vasileiadis discloses a next inner membrane tube (1) through which hydrogen permeates (col. 6, lns. 16-21; FIG. 1). Vasileiadis further discloses a far outer impermeable tube/shell (7) that prevents passage of hydrogen to atmosphere (FIG. 1). The Examiner asserts that in disclosing the hydrogen-permeable next inner membrane tube (1), Vasileiadis discloses a support layer that is breathable. However, the Examiner does not address the remainder of the limitation, which recites that the support layer is breathable "to enable passage of said hydrogen to atmosphere."

Furthermore, Applicant reiterates that modifying the permreactor-separator of Vasileiadis to include a support layer that is breathable to enable passage of hydrogen to the atmosphere would render the permreactor-separator of Vasileiadis unsatisfactory for its intended purpose of capturing hydrogen for use in a fuel cell. "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose,

then there is no suggestion or motivation to make the proposed modification." In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). See MPEP 2143.01.

VIII. CLAIMS

A copy of the claims involved in the present appeal are attached hereto as Appendix A. As indicated above, the claims in Appendix A include the amendments filed by Applicant on April 28, 2008.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 07-0960, under Order No. 8540G-000210/US from which the undersigned is authorized to draw.

Dated: January 12, 2010

Respectfully submitted,

By /Ryan W. Massey/
Ryan W. Massey
Registration No.: 38,543
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1258
Attorney for Applicant

CLAIMS APPENDIX

Claims Involved in the Appeal of Application Serial No. 10/717,356

1. A fuel cell system having a cooling fluid flowing therethrough, comprising:

a fuel cell stack including a plurality of proton exchange membranes each having an anode side and a cathode side and a plurality of coolant passages extending between adjacent ones of said plurality of proton exchange membranes; and

a conduit in fluid communication with said coolant passages and through which said cooling fluid flows and comprising a first layer of hydrogen-permeable material, wherein hydrogen within said cooling fluid permeates through said first layer of hydrogen-permeable material to reduce a hydrogen content of said cooling fluid.

2. The fuel cell system of claim 1 further comprising a support layer disposed concentric to said first layer of hydrogen-permeable material.

3. The fuel cell system of claim 2 wherein said support layer is breathable to enable passage of said hydrogen to atmosphere.

4. The fuel cell system of claim 2 wherein said support layer includes a mesh through which said hydrogen permeates.

5. The fuel cell system of claim 1 further comprising a second layer of hydrogen-permeable material disposed about said first layer of hydrogen-permeable material.

6. The fuel cell system of claim 5 further comprising a support layer disposed between said first and second layers of hydrogen permeable material.

7. The fuel cell system of claim 1 further comprising a fluid-permeable protective layer disposed about said conduit, protecting said conduit from impact with debris.

8. The fuel cell system of claim 1 further comprising a hydrogen-permeable layer having a partial catalyst coating to induce a reaction between said hydrogen and oxygen to produce water.

EVIDENCE APPENDIX

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

RELATED PROCEEDINGS APPENDIX

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.

15282259.1